

BT-5/D-21
ADVANCED ALGORITHMS
Paper-PE-CS-T 307A

45176

Time Allowed : 3 Hours]

[Maximum Marks : 75

Note : Attempt five questions in all, selecting at least one question from each Unit. All questions carry equal marks.

UNIT-I

1. (a) Explain Big-oh, Big-omega and Big-theta notations of the complexity with suitable examples. 7
- (b) What is Binary search tree? Write down the insertion algorithm of Binary search tree and insert the following elements: 35, 29, 17, 44, 55, 67, 3, 2, 114, 55, 15, 28, 88, and 41. Also, explain the problem of skewness in BST. 8
2. (a) Solve the following recurrence relation using Master theorem: 7
 $T(n) = 2T(n/4) + \sqrt{n}$
- (b) Using recursive tree method solve the following: 8
 $T(n) = T(n/10) + T(9n/10) + n$

UNIT-II

3. (a) What is Activity Selection problem? Solve following problem using greedy algorithm. Set of activity 8
 $S = \{a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8, a_9, a_{10}, a_{11}\}$

l	1	2	3	4	5	6	7	8	9	10	11
s_i	1	3	0	5	3	5	6	8	8	2	12
f_i	4	5	6	7	8	9	10	11	12	13	14

- (b) Explain the fundamental steps of finding longest common subsequence using dynamic programming. Find LCS between two strings $X=BACDB$ and $Y=BDCB$. 7

4. (a) Explain Strassen's algorithm to compute the matrix multiplication and analyze its complexity. Also multiply following matrix using Strassen's Algorithm. 8

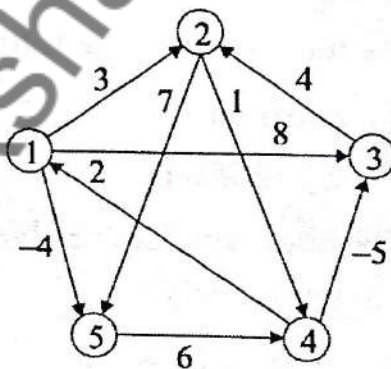
$$X = \begin{bmatrix} 3 & 2 \\ 4 & 8 \end{bmatrix} \quad Y = \begin{bmatrix} 1 & 5 \\ 9 & 6 \end{bmatrix}$$

- (b) Write Huffman code for following symbols 7

Symbol	A	B	C	D	E	F
Frequency	45	12	13	16	9	5

UNIT-III

5. (a) Define spanning tree. Write the pseudo code of the Kruskal algorithm for finding minimum spanning tree. Also analyze its complexity. 8
- (b) What is topological sort? Explain with an example. 7
6. (a) Explain Floyd-Warshall Algorithm to find all pair shortest path. Find all pair shortest path of following problem also analyze its complexity. 8



- (b) Write shortest path Dijkstra Algorithm and explain its steps. 7

UNIT-IV

7. (a) Write Naive string matching algorithm and explain its working with an example. 7
- (b) Write Rabin-Karp string matching algorithm. 8
8. Explain different components of Knuth-Morris-Pratt algorithm and explain them by taking an example. 15